SOIL REMEDIATION REPORT
ADDENDUM 1

501 ELLIS STREET

MOUNTAIN VIEW, CALIFORNIA

Conducted November 6 to December 31, 1991

Submitted In Fulfillment Of
The Requirements Of U.S. EPA
CERCLA §106 Order, Docket No. 91-4

Prepared for

NEC Electronics Inc.

By

Bechtel Environmental, Inc.

San Francisco, CA

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18 pages

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This document was prepared in compliance with Section IX.A.10 of the Administrative Order for Remedial Design and Remedial Action, EPA Docket No. 91-4.

Janet L Argyres
Bechtel Environmental, Inc.

NEC Electronics Inc.

ADDENDUM 1 TO
SOIL REMEDIATION REPORT
501 ELLIS STREET

This addendum to the Soil Remediation Report for 501 Ellis Street was prepared in response to the Environmental Protection Agency's (EPA) review comments dated March 30, 1995.

GENERAL COMMENTS

Comment 1: *In Area 2 and some portions of Area 1, the excavations did not extend to the exploratory borings that were utilized as "clean" boundaries. Since the approved sidewall sampling, proposed in the Proposed Remedial Design and Construction Operation and Maintenance Plan for 501 Ellis document was abandoned, these exploratory borings are the only data points that can confirm contaminant concentrations below the clean up standard. In areas where the excavations did not extend to the exploratory boring locations there is potential for contaminants to still remain. The measurement of volatilized chemical concentrations from the top of auger-holes with an HNU is not an acceptable method to document the extent of soil contamination in an excavation. Even the use of field analytical equipment should be accompanied by soil samples sent to an off-site laboratory to verify on-site results. The areas where soil excavation did not extend to the exploratory borings will need to be targeted for soil sampling in the Confirmatory Sampling work plan.*

Response: Confirmatory sampling of the soil remediation at 501 Ellis Street did not deviate from the proposed design. Sidewall sampling during excavation was not proposed as the primary means of verifying extent of excavation in the Proposed Final Design (*Proposed Final Remedial Design and Construction Operation and Maintenance Plan,* Bechtel, 1991). Existing borings from the Phase IV investigation and exploratory borings drilled prior to excavation which defined the extent of soil contamination and clean boundaries were intended to provide sufficient data equivalent to sidewall sampling. These borings, spaced at 5 to 6-foot intervals along clean boundaries with samples collected every 1.5 feet vertically, would result in a coverage of approximately 3 samples per 50 square feet of a theoretical excavation wall. Only if it was deemed that additional samples were necessary to provide

such coverage, were supplementary samples from the sides and bottom of the excavation to be obtained. However, data from the borings were determined to be sufficient and actual excavation wall sampling was unnecessary.

In Area 2 and some portions of Area 1, larger areas that extended beyond the clean boundaries defined by the exploratory borings were removed simply due to the selected method of excavation. Each bucket auger lift excavated a minimum cylindrical section of approximately 3 to 3.5 feet in diameter. Furthermore, these auger holes were overlapped to ensure that the defined hot spot was completely removed, and thus, resulted in the removal of excess soil. At some locations, it was noted that the excavation did not completely extend to the clean boundary defined by the exploratory borings. For example, as depicted in Photograph A.5, the excavation at Area 2 did not completely extend to the southeast clean boundary indicated by Boring BIV-045 (shown along the white line). In these cases, however, since the difference was generally a foot or less, it was not considered necessary to drill an additional confirmation boring.

As discussed below in the Response to Specific Comment 6, the HNu field instrument was never used to determine extent of soil contamination during the excavation. A minimum of 3 samples were collected for on-site laboratory analysis from each clean boundary boring and at least 30 percent were also submitted to the offsite laboratory for confirmatory analysis.

Comment 2: *The SRR indicates that the break in the buried waste line was discovered where the line entered the building. The location of the line suggests that contamination may be present adjacent to the building and beneath it. No sampling was conducted directly adjacent to the building wall. The underground solvent tank and neutralization tank, removed in 1984, was also located adjacent to the building. Table 12 indicates that trichloroethene (TCE) was detected in exploratory borings R-9 and R-35 at depths from 8.5 to 15.5 feet below ground surface (bgs). Detections at these depths in the vicinity of the former tanks indicates that contamination may have originated from these sources and have migrated. No additional borings were installed between R-9, R-35 and the building wall. The excavation extended to these borings,*

but since no excavation wall samples were analyzed for verification, there is the potential for contaminants above the clean up level to exist between these borings and the building. Additionally, contaminants within the vicinity of the former tanks may have migrated to boring R-6 without being detected at R-1 or R-7. Additional sampling is recommended in these areas to determine if contaminants above clean up levels remain.

Response: Removal of the underground waste solvent tank and acid neutralization sump in 1984 required the installation of subsurface steel plates approximately 2 feet outside and parallel to the building wall in order to maintain the building's structural integrity. However, the presence of these plates and their proximity to the wall influenced the subsequent placement of exploratory borings and sample locations in the immediate area. When samples from exploratory borings R-9 and R-35 indicated TCE soil concentration over 0.5 ppm, an additional row of borings were placed as close as practicable to confirm the findings and determine the extent of contamination. However, since it was not feasible to drill between the building wall and the steel plate, borings R-1 and R-7 were placed inside the building adjacent to the outer wall within 5 feet of R-9 and R-35. Laboratory analyses of samples from R-1 and R-7 reported TCE concentrations below the clean up level which suggested that a distinct area of contamination is localized within Area 1. Consequently, excavation of Area 1 included the locations of borings R-9 and R-35 and proceeded beyond to the steel plate.

Comment 3: *The data from R-6 showing TCE levels above the clean up criteria can not be dismissed with statistical analysis. The SRR must address this data and evaluate alternatives for determining the extent of the contamination at that location.*

Response: Only one soil sample from exploratory boring R-6 slightly exceeded the 0.5 ppm TCE soil clean-up criteria with a result of 0.55 ppm at a depth of 12.0 to 12.5 feet. Samples from surrounding borings (R-1, R-7, R-11, and R-12) were all below the 0.5 ppm level, which suggest that the potential area of contamination is localized. At this depth, the primary concern for this low concentration of TCE would be its potential threat to the underlying ground water (it should be noted that the 0.5 ppm soil remediation level was based

mainly on the potential for migration of TCE to the shallow ground-water aquifer). Its actual impact is expected to be minimal or undetectable. In any case, NEC is currently proceeding with the design of a ground-water remediation system at 501 Ellis Street.

Comment 4: *The document states that ten percent of the samples were analyzed for additional parameters such as EPA Method 8020 and 8040 for documentation purposes. Please include a description of how soil samples were chosen for these analytical parameters, what is meant by "documentation purposes", and a discussion and interpretation of the analytical results.*

Response: Similar to the rationale given in the Explanation of Significant Differences, TCE was selected as the indicator compound to monitor the extent of soil contamination and the progress of soil remediation for all chemicals since it was the predominant chemical found at the 501 Ellis Street property. To address the possibility that other chemicals present in the subsurface soils may not be commingled with TCE and may act as a continuing source or contamination to ground water, a random 10 percent of the exploratory borings were selected and analyzed for other chemicals of concern. This was considered a documentation measure since clean-up standards were not established. Additionally, to assess the validity of the assumption that TCE accurately acts as an indicator compound during remediation, a random 10 percent of the treated soil samples were also analyzed for the other chemicals of concern.

Due to the small number and low concentrations of contaminants found in samples from exploratory borings, an evaluation of TCE as an indicator compound was not possible. However, results for the Phase IV Investigation data, where some of the borings were centrally located in the hot spot areas, supported the selection of TCE as the most appropriate indicator compound. Furthermore, analytical results of the treated soil indicated that all contaminants were remediated to below the clean-up standard or applicable clean-up levels.

Comment 5: *The Order (section IX.c.2(f)) states that each respondent shall submit a Confirmatory Sampling Report to EPA for approval*

at the conclusion of the soil remediation activities. Section IX.c.2.(2) states that an Operation and Maintenance Plan is due within 180 days of the initiation of construction. The excavation and treatment of soils at 501 Ellis constitutes the initiation of construction. Requirements of the O&M plan include provisions for "ensuring the effectiveness of the remedy through continued monitoring". The revised SRR should include a schedule for the submittal of an O&M plan and a Confirmatory Soil Sampling work plan. Confirmatory soil sampling must address all areas in which any of the chemicals of concern have been detected above their respective clean up standards.

Response: As discussed in Section 1 of the Soil Remediation Report, Section 3.6.4.1 of the report is intended to meet the confirmatory sampling requirements in Section IX.D.2(f) of the Administrative Order. In addition, responses in this addendum fulfill EPA's requirement that any areas in which any chemicals of concern have been detected above their respective clean-up standards be addressed.

An Operation and Maintenance Plan under Section IX.D.2 (c)(2) for operating and maintaining source related equipment was not considered applicable due to the short duration of the selected method of remediation. Ensuring the effectiveness of the remedy through continued monitoring is more applicable to soil vapor extraction or ground-water treatment. However, such requirements for the remediated vadose zone soils can be incorporated into the ground-water remediation program.

SPECIFIC COMMENTS

Comment 1: *pg. 1-4 The text states that the Proposed Final Remedial Design and Construction Operation and Maintenance Plan (RDD) submitted September 1991, was approved by EPA on October 31, 1991. In reviewing the EPA correspondence it seems that the RDD was partially approved allowing the removal actions and further characterization to proceed. The correspondence states, "approval of the remedial design documents is contingent in part on obtaining EPA's final approval of the Work Plan and the characterization of the unsaturated and saturated zone soil contamination." The text should be revised to more clearly reflect the nature of EPA's approval.*

Response: Comment Noted. The text should read: "On October 9, 1991, EPA verbally consented that NEC proceed with the proposed removal action (written approval on October 31, 1991). Approval of the Phase I Source Control Remedial Design and Proposed Final Design is contingent in part on obtaining EPA's final approval of the Source Control Work Plan and the characterization of the unsaturated and saturated zone soil contamination."

Comment 2: *pg. 1-4 & 1-5 It should be noted that the definition of "clean" and "contaminated" soils should not only be based on TCE levels. The Order lists fifteen chemicals of concern and though TCE was chosen as an "indicator parameter" for soil cleanup, the Explanation of Significant Difference clearly states that "all chemicals must be remediated so that their respective concentrations are at or below applicable or relevant and appropriate requirements and do not exceed maximum cumulative mixtures utilized in operations at 501 Ellis Street. The revised text should address the other chemicals of concern detected from sampling on site, such as 1,2,4 trichlorobenzene, freon 113, phenol and tetrachloroethene and evaluate whether remediating for TCE has effectively remediated other chemicals to below clean up standards.*

Response: The reference to ARARs or soil cleanup criteria in EPA's comments was clarified by EPA in a meeting conducted on April 19, 1995. ARARs are defined as 100 times the State or Federal Maximum Contaminant Level (MCL), following the derivation of the TCE soil cleanup level. Results of samples

collected during the soil remediation were evaluated using this criteria to determine if any chemicals exceed their respective ARARs. The more stringent of either the State or Federal MCL was used in the evaluation.

Table A.1 provides a comparison of organic compounds detected in soil samples collected from exploratory borings drilled at Areas 1 and 2 with applicable soil cleanup criteria. Samples were analyzed by EPA Methods 8010 (plus Freon 113 and 1,2,4-Trichlorobenzene), 8020, and 8040 for halogenated volatile organics, aromatic volatile organics, and phenols, respectively. As shown, none of the organic compounds detected in samples collected during the soil remediation exceed their respective cleanup criteria.

Comment 3: *pg. 2-1, section 2.1 a) The grid spacing is rectangular in shape, therefore the terminology "triangular grid spacing" should be corrected. b) locations of some of the exploratory borings have been changed from those proposed in the RDD. A discussion of the basis for these changes should be included in the text.*

Response: The 5.6 foot grid spacing proposed in the final design is triangular in origin following that described and illustrated (page 9-5) in the EPA guidance document, *Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and Solid Media,* February 1989, EPA 230/02-89-042. However, the grid pattern may initially appear rectangular due to its orientation on the site map.

Locations of some of the exploratory borings differed from those proposed in the final design for two main reasons. Since the Phase IV Investigation boring locations were not surveyed, the area of Area 1 was slightly underestimated and as a result additional exploratory borings were required to remain consistent with the 5.6 foot triangular grid approach and provide the proposed statistical confidence. Boring locations were slightly shifted when the grid pattern was applied to obtain the "best fit" configuration.

Secondly, there were some minor relocation of borings due to drilling rig access, presence of underground utilities, and/or inherent drift of the auger bit. However, such deviations were no more than a few feet and considered to have a negligible effect. Although the proposed final design

accounted for these type of deviations by specifying an error range of ± 2 feet, the relatively small scale of the grid pattern and boring location map accentuated these minor changes.

Comment 4: *pg. 2-7, section 2.5.4 The SRR states that QA/QC procedures were generally in accordance with those described in the QAPP. The text should report whether corrective actions were taken in accordance with the QAPP or discuss any deviations from the QAPP and the actions taken.*

Response: A field system audit was conducted during the first week of remediation activities by the Project Quality Assurance Supervisor. The audit included an observation of exploratory drilling, soil sample collection, decontamination procedures, chain-of-custody procedures, and field analyses to ensure such work was conducted according to the Quality Assurance Project Plan (QAPjP) and final design work plan. No significant deviations from the QAPjP were noted and corrective action was unnecessary.

Upon completion of remediation activities, it was noted that travel blank samples were omitted from 2 of the 16 sample delivery containers. However, since the travel blanks from the other shipments exhibited no signs of cross-contamination or in-transit contamination, these deviations are minor and analytical data quality is not considered to be affected.

Comment 5: *pg. 3-12, section 3.6.4.1 The utilization of exploratory borings to determine the extent of contamination is very different from excavation wall sampling. Changes in proposed protocol should be approved by the EPA project manager before implementation. As discussed in the general comments, in several areas the extent of the excavation did not reach the "clean" exploratory borings, therefore there is no verification that the extent of the excavation was sufficient. In addition boring R-9 and R-35 on the edge of excavations in Area 1 showed TCE contamination at various depths. No boring is present adjacent to this area to confirm that the extent of the excavation is sufficient.*

Response: As discussed above in Response to General Comment 1, confirmatory sampling of the soil remediation at 501 Ellis Street did not deviate from the proposed design. Sidewall

sampling during excavation was not proposed as the primary means of verifying extent of excavation in the Proposed Final Design (Bechtel, 1991). Existing borings from the Phase IV investigation and exploratory borings drilled prior to excavation which defined the extent of soil contamination and clean boundaries were intended to provide sufficient data equivalent of sidewall sampling. These borings, spaced at 5 to 6 feet intervals along clean boundaries with samples collected every 1.5 feet vertically, would result in a coverage of approximately 3 samples per 50 square feet of a theoretical excavation wall. Only if it was deemed that additional samples were necessary to provide such coverage, were supplementary samples from the sides and bottom of the excavation to be obtained. However, data from the borings were determined to be sufficient and actual excavation wall sampling was unnecessary.

In Area 2 and some portions of Area 1, larger areas that extended beyond the clean boundaries defined by the exploratory borings were removed simply due to the selected method of excavation. Each bucket auger lift excavated a minimum cylindrical section of approximately 3 to 3.5 feet in diameter. Furthermore, these auger holes were overlapped to ensure that the defined hot spot was completely removed, and thus, resulted in the removal of excess soil. At some locations, it was noted that the excavation did not completely extend to the clean boundary defined by the exploratory borings. For example, as depicted in Photograph A.5, the excavation at Area 2 did not completely extend to the southeast clean boundary indicated by Boring BIV-045 (shown along the white line). In these cases, however, since the difference was generally a foot or less, it was not considered necessary to drill an additional confirmation boring.

See also Response to General Comment 2.

Comment 6: *pg. 3-13, section 3.6.4.2 Use of an HNU to determine the extent of soil contamination is not appropriate unless confirmed with analytical data. Gathering data from the "breathing space" at the top of the auger-hole allows for dilution. Verification that the extent of the excavation was sufficient should have been from the analysis of soil samples. The extent of contamination should be confirmed through laboratory analysis of confirmatory soil samples in areas*

where the excavation did not extend to the exploratory borings or in areas where exploratory borings detected TCE or other chemicals of concern.

Response: The HNu PI 101 field instrument (HNu) was never used for determining the extent of soil contamination or for verification of the extent of the excavation. Analytical data from samples taken from the exploratory borings prior to actual excavation were considered sufficient for this purpose. The HNu was used primarily to monitor the work space breathing zone around the auger holes for health and safety precautions. A secondary function of the HNu instrument was to provide an additional check of the excavated materials. Data from the exploratory borings indicated that soil contamination was limited to distinct depth intervals, usually below 8 feet from ground surface. Consequently, excavated soils from the designated clean intervals were separately stockpiled unless the HNu readings suggested potential contamination. In such cases, the auger lift would be transported to the treatment area. Excavated soils from the designated contaminated intervals were treated regardless of HNu results. As an additional measure, the designated clean soil stockpiles were sampled and analyzed prior to use as excavation backfill.

During excavation activities, there were two instances where consistently elevated HNu readings suggested possible additional contamination at the edge of the excavated area, even though samples from confirmation borings on the clean boundary did not exhibit contamination. In an effort to prevent any down-time in the field waiting for analytical results or risk the additional mobilization of the field crew and equipment, the excavation was conservatively extended one auger width beyond the clean boundary. Samples were collected from the excavated material and analytical results indicated TCE concentrations were below the 0.5 ppm clean-up standard.

LIST OF ATTACHMENTS

Tables

Photographs

Table A.1
ORGANIC COMPOUNDS OTHER THAN TCE DETECTED IN SOIL SAMPLES
FROM EXPLORATORY BORINGS
NEC Electronics Inc., 501 Ellis Street, Mountain View, CA

	Minimum Concentration (ug/kg)	Maximum Concentration (ug/kg)	Number of Samples Analyzed	Number of Samples in Which Detected	Frequency of Detections (Percent)	MCL (ug/l) (a)	MCL*100 (ug/kg)	Sample(s) above MCL*100	Depth of Sample above MCL*100 (ft)
1,2-Dichlorobenzene	210	210	10	1	10	600	60000	—	—
Freon 113	7	1500	8	4	50	1200 (b)	120000	—	—
Tetrachloroethene	24	24	10	1	10	5	500	—	—
1,2,4-Trichlorobenzene	24	3900	8	4	50	70 (c)	7000	—	—
Vinyl Chloride	18	18	10	1	10	0.5 (b)	50	—	—
Ethyl Benzene	8	1500	10	2	20	680 (b)	68000	—	—
Toluene	6	82	10	3	30	1000	100000	—	—
Xylene	9	1300	10	2	20	1750	175000	—	—

Notes:

NA = Not Analyzed A dashed line indicates that the information is not available or not applicable.

ARARs = Applicable or Relevant and Appropriate (MCL*100)

MCL = Maximum Contaminant Level

Samples were analyzed by EPA 8010 (plus Freon 113 and 1,2,4-Trichlorobenzene), 8020, and 8040

(a) Federal MCLs unless otherwise indicated.

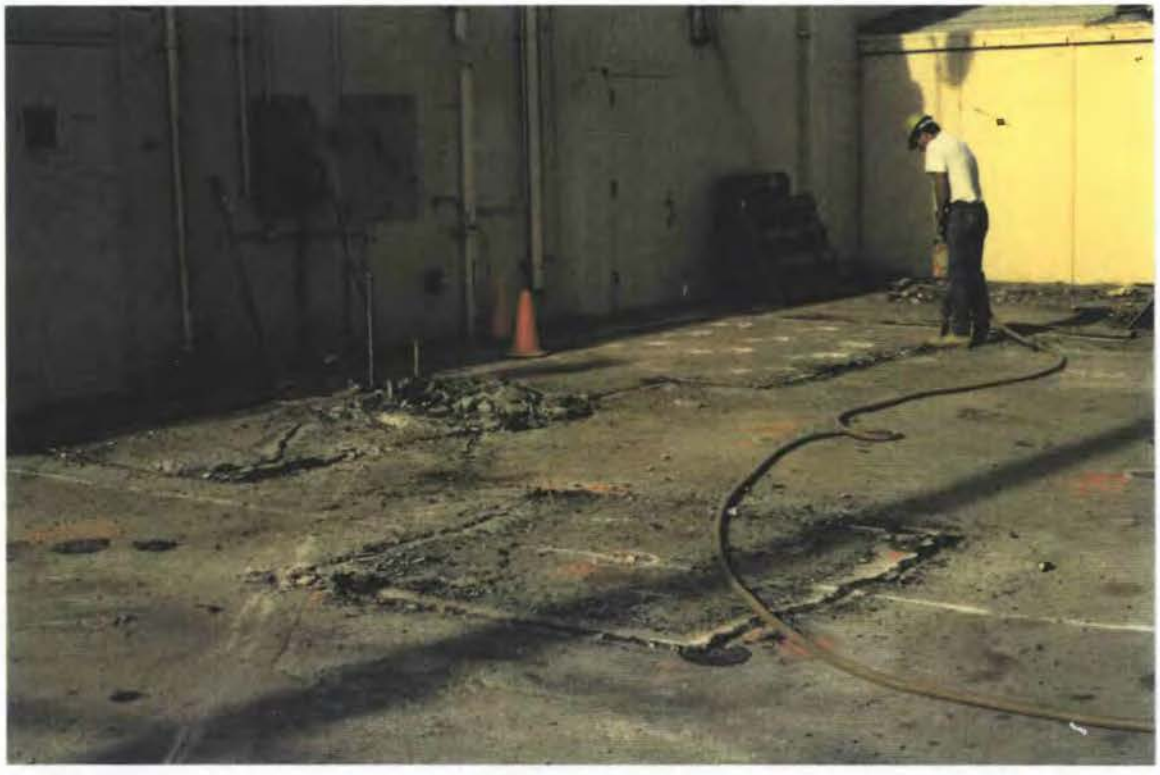
(b) State MCLs

(c) Effective January 17, 1994.

Photograph A.1: Area 1 - After Completion of Exploratory Borings

Photograph A.2: Area 2 - After Completion of Exploratory Borings

Photograph A.3: Area 1 - Boring Adjacent to Building Wall

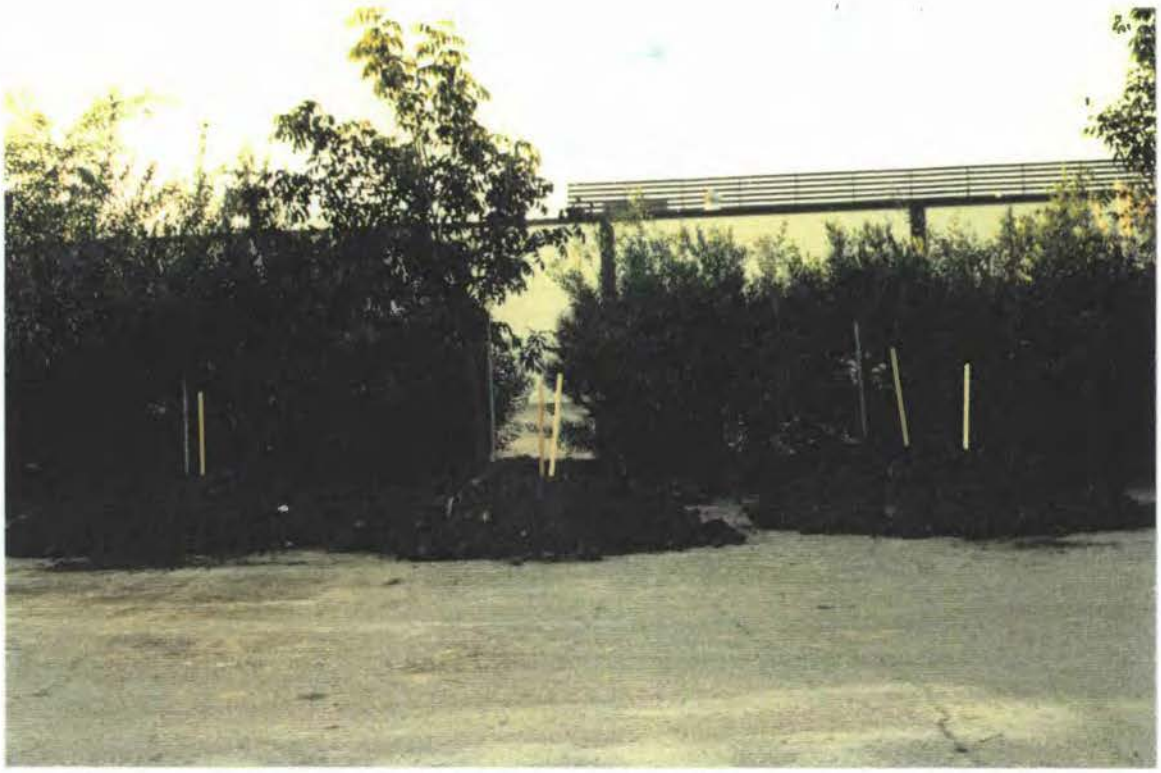


Photograph A.4: Area 1 - Initial Excavation Area

Photograph A.5: Area 2 - Initial Excavation Area

Photograph A.6: Excavating with Bucket Auger

Photograph A.7: Loading Excavated Soil For Transport



Photograph A.8: Designated Clean Soil Stockpiles

Photograph A.9: Soil Treatment Area